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A NOTE ON THE TRILOBITE GENUS *DIXIPHOPYGE*

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ABSTRACT

Recovery of the first nearly complete thoracopygon of the trilobite genus *Dixiphopyge* Brezinski from the Chouteau Formation of central Missouri aids in evaluating the paleoecology and taxonomic affinities of this genus. *Dixiphopyge* is an isopygous trilobite, suboval in outline, and possessing nine thoracic segments. At the apex of each axial ring is a hollow tubercle that may represent the base of a short spine. *Dixiphopyge* inhabited muddy biostrome environments. In an enrolled position *Dixiphopyge* is interpreted to have looked somewhat like a porcupine with its spines radiating outward, presumably to inhibit its consumption by predators. Previous subfamily assignment of *Dixiphopyge* in the Otarioninae with *Cyphaspis* and *Namuropyge* may have been incorrect, because the latter two genera possess broad preglabellar fields and are micropygous.

INTRODUCTION

The genus *Dixiphopyge* was erected by Brezinski (1988) and is based on the trilobite species *Brachymetopus armatus* Vogdes (1891) from the Lower Mississippian Chouteau Formation of central Missouri. *Dixiphopyge* was based upon and described from co-occurring disarticulated cranidial and pygidial fragments, interpreted by Brezinski (1988) to belong to the same species. Recently, an articulated thorax with the pygidium and part of an eroded cephalon attached was recovered from the Chouteau of central Missouri. This new specimen provides insight into the taxonomy and paleoecology of the genus *Dixiphopyge* Brezinski.

The purpose of this note is to describe the new specimen of *Dixiphopyge,* which confirms the conspecific nature of the pygidia and cranidia previously known from disjunct fragments, and to discuss inferences about the paleoecology of this trilobite genus. The specimen herein described is reposited within the invertebrate paleontology collections at Carnegie Museum of Natural History (CM).

PALEOECOLOGY

Perhaps the single most important inference about the paleoecology of *Dixiphopyge armatus* can be gleaned from its paleoenvironmental distribution. Brezinski (1986) discussed the distribution of trilobite species from the Chouteau Formation of central Missouri and found that *D. armatus* consistently inhabited lime mud biostromes of the lower part of the Chouteau Formation. These mud biostromes are typically less than 10 ft in thickness and contain abundant fenestrate bryozoans (King, 1980). King (1980:18) likened these mud biostromes to incipient Waulsortian mud mounds. Tilsley (1977) documented the presence of the closely related spinose trilobite *Namuropyge* in a carbonate buildup in Great Britain. Likewise, Miller (1973) proposed that *Namuropyge* inhabited cryptic environments similar to those found in carbonate buildups. However, the Chouteau mud biostromes do not appear to have presented the diverse cryptic settings that

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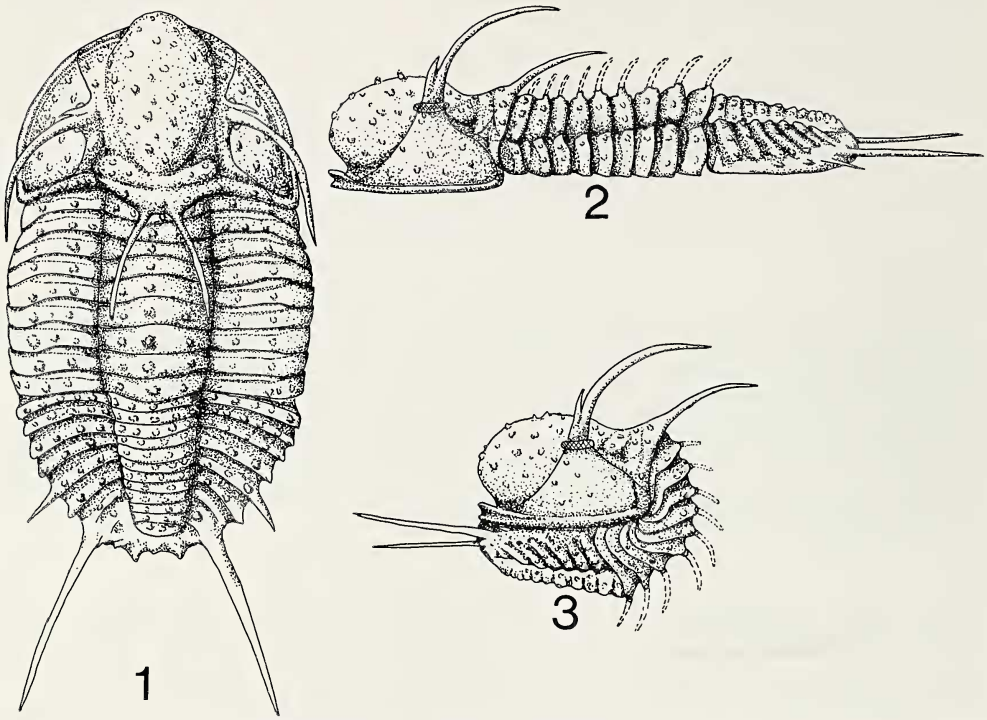

Fig 1.—1–3, reconstructed exoskeleton of *Dixiphopyge armatus* (Vogdes) in dorsal, lateral extended, and lateral enrolled views. Length and shape of axial spines is speculative.

were available in the carbonate buildups of Great Britain. In fact, the Chouteau buildups appear to have been more like mud mounds rather than reefs.

Inferences about the autecology of spinose trilobites such as *Dixiphopyge* have been numerous. Clarkson (1969) interpreted the Silurian odontopleurid trilobite *Leonaspis* as having utilized its radially directed, marginal spines as a means to inhibit sinking into soft substrate. Hahn et al. (1980) proposed a similar function for the marginal spines in *Namuropyge. Dixiphopyge* does not possess the large marginal spines which could be used in this way. Instead, the spines on *Dixiphopyge* are directed vertically and posteriorly (Fig. 1.2). These spines may have inhibited predators from seizing this species. In an enrolled position (Fig. 1.3) the spines may have effectively enlarged the size of the enrolled specimen making it more difficult to consume. It seems clear from the reconstruction shown in Figure 1.3 that in an enrolled position *Dixiphopyge*'s spines were more likely a defense mechanism rather than an adaptation to substrate conditions. Indeed, in an enrolled position *Dixiphopyge* is interpreted to have resembled a curled-up porcupine.

SYSTEMATIC PALEONTOLOGY

Genus *Dixiphopyge* Brezinski, 1988
Dixiphopyge armatus (Vogdes, 1891)
Fig. 1.1–1.3, 2.1–2.3

Brachymetopus armatus Vogdes, 1891:617–618, pl. 15, fig. 4, 5; S. Weller, 1898:149; Branson and Andrews, 1938:120, pl. 15, fig. 15–18; Shimer and Shrock, 1944:pl. 275, fig. 13–15.

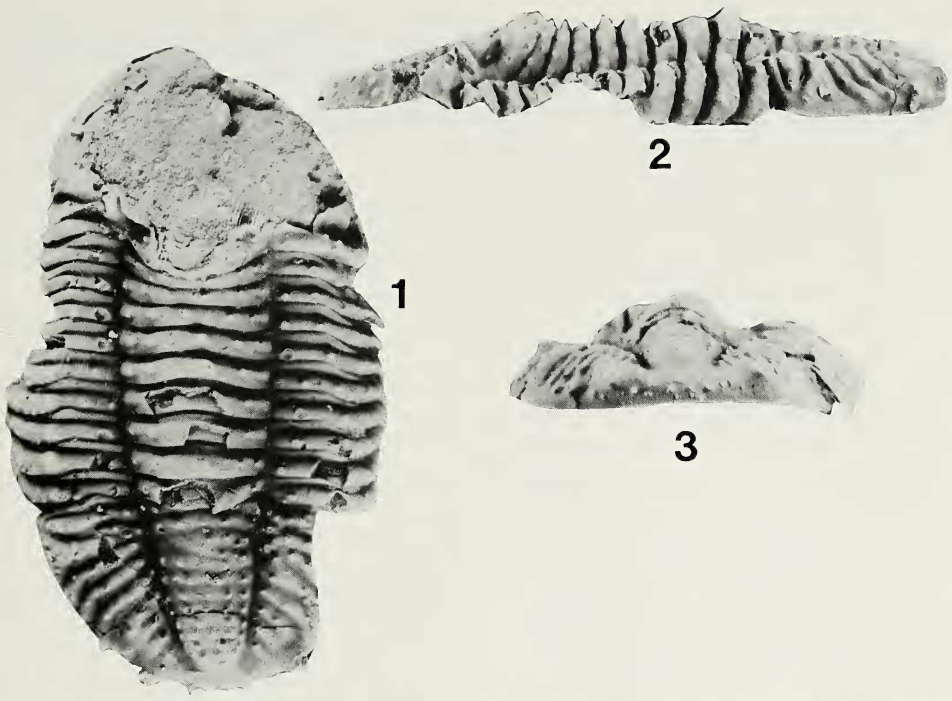

Fig. 2.—1–3, *Dixiphopyge armatus* (Vogdes). Dorsal, lateral, and posterior views of articulated thoracopygon collected from the Chouteau Formation, Boone County, Missouri; CM 35078; × 4.0.

Brachymetopus sp. Branson and Andrews, 1938:115, fig. 11.
Namuropyge armata (Vogdes, 1891), Hahn, Hahn, and Brauckmann, 1980:pl. 2, fig. 9.
Namuropyge? *armata* Brezinski, 1986:878–879.
Dixiphopyge armatus Brezinski, 1988:104–105, fig. 2, 3.1–3.9.

New Material.—A single articulated thoracopygon with a mostly eroded cephalon from the lower Chouteau Formation near Providence, Boone County, Missouri, CM 35078.

Addended Description.—Isopygous trilobite with exoskeleton suboval in outline. For cranidial description, see Brezinski (1988:104–105). Lateral border furrow narrow, deep, border sharply rounded, tuberculate; genal angle broadly rounded; posterior border furrow shallowing adaxially, curved in transverse profile, steeply inclined abaxially; posterior border rounded.

Thorax composed of nine subequal segments; more anterior segments slightly smaller in transverse direction; pleurae rounded at fulcrum, steeply inclined abaxially, flattened adaxially; axial furrow sharp, shallow; pleural furrows deep, broad at fulcrum, shallowing adaxially and distally; pleurae rounded in longitudinal profile, ornamented posteriorly by three to four tubercles at the posterior apex; axial rings semicircular in transverse profile, rounded in longitudinal profile; ring furrows deep, wide, sinuous; rings ornamented by five tubercles, smaller adjacent to axial furrow, larger at ring apex; apical tubercles hollow, large, increasing in size posteriorly.

Pygidium moderately vaulted, subparabolic in outline. Axis of 11 rings, outline tapering moderately posteriorly; descending slightly posteriorly in longitudinal

profile; nearly reaching posterior terminus. Rings of low vaulting, semicircular in transverse and longitudinal profile ornamented by a row of five tubercles along apex; ring furrows shallow, narrow, rounded. Axial furrow shallow, narrow, curved along length. Pleural field of low vaulting, composed of eight ribs laterally directed in front, becoming curved and directed more posteriorly to the rear; ribs rounded in transverse profile, narrow, ornamented by a row of tubercles numbering five on first rib and one on rib number eight. Pleural furrows broad, moderately deep, rounded in longitudinal profile, shallowing posteriorly. Border indistinct, exhibits posteriolaterally directed spines opposite pleural ribs five, six, and eight; posterior terminus exhibiting six to seven small spines.

Remarks.—Although the cephalon is mostly eroded, the highly vaulted occipital ring and the course of the lateral portion of the occipital furrow and the lateral preoccipital lobes compare favorably with those described and illustrated by Brezinski (1988:104–105, fig. 2.1, 3.1–3.4, 3.9). The pygidium is nearly identical to that of *D. armatus* (Vogdes) as illustrated by Brezinski (1988:fig. 2.3, 3.5–3.8), differing only in the distal bifurcation of the second anteriormost pleural rib on the left side. This is interpreted as a teratological manifestation inasmuch no such bifurcation is evident in those specimens illustrated by Brezinski (1988:fig.3.5–3.8) and, therefore, probably has no taxonomic significance.

Taxonomic Affinities.—Brezinski (1988) proposed that *Dixiphopyge* was closely related to members of the Otarioninae such as *Cyphaspis* and *Namuropyge*. Recently, Adrain and Chatterton (1994) expressed uncertainty regarding the closeness of this relationship. Indeed, members of the subfamily Otarioninae are diagnosed by the presence of a preglabellar field and typically are micropygous. *Dixiphopyge* lacks any preglabellar field and is clearly isopygous. Although other characters such as the bulbous glabella and pronounced spinosity are compatible with the Otarioninae, *Dixiphopyge* might well be assignable to a separate subfamily of which it is the only currently known member.

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